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Epithelioma

of the

Eye

Robert T. Bashara*

“Cancer Eye” is a term commonly used by cattlemen when referring to ocular squamous cell carcinoma in cattle. The Meat Inspection Division, Agriculture Research Service has adopted the term “epithelioma of the eye” for the same condition and this term will be used interchangeably with “cancer eye” throughout this report.

Only a brief discussion of the etiological entities of this neoplasm will be included in this report with complete exclusion of the clinical aspects. My main concern will be that of relating my observations of cancer eye cases tagged as United States Suspect at a federally inspected Sioux City meat packing plant.

As with many neoplasms, the etiology of epithelioma of the eye is variable and uncertain. Many viewpoints exist and I found several investigators had convincing evidence to support each of their beliefs. Several have suggested that irritation from dust and sand predispose to the neoplasm and as a result more epithelio-

mas are seen in cattle raised in the western plain states. This follows the theory which accounts for many types of neoplasms, especially those involving the skin; the theory being that prolonged irritation to tissues is capable of producing neoplastic growth in those tissues. Most cases of cancer eye are seen in cattle which are six years or older and raised in the western states where prolonged irritation of the ocular tissues by the sand and dust would be capable of producing a neoplastic growth.

Anderson and Skinner report that studies of the effect of sunlight on cancer eye support the hypothesis that ultraviolet light is a contributing factor in the development of epithelioma of the eye. It seems that sunlight plus a decrease in amount or lack of circumocular pigmentation increases the susceptibility of certain individuals or breeds. This has been given as the reason for the greater incidence of cancer eye in Hereford cattle than in other breeds. It is also believed by some that the susceptibility to cancer eye is inherent in the Hereford breed. Hereditary factors are discussed under three classifications: (1) inheritance of

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individual differences in susceptibility, (2) inheritance of breed differences in susceptibility, and (3) relationship of circumocular pigmentation to cancer eye. Reports on the hereditary factors concerning cancer eye are not sufficient to provide conclusive evidence as to the etiology.

More recent work indicates that the nutritional plane of cattle feeding has definite bearing on the occurrence of cancer eye. In tests where cows were fed three levels of winter feeding, the following was observed: the higher level of feeding increased (1) the average number of sites on the eyes affected by the lesions and their rate of increase with age, (2) the number of afflicted animals, and (3) the state of pathogenesis of the lesions. The survival rate of those animals on the higher feeding levels was lower than those on the lower feeding levels. These results are attributed to faster physiological aging of animals on high nutritional planes.

I believe that each of these etiological hypothesis has some significance in the development of cancer eye. As with many forms of neoplastic tissue, their development is caused by many factors and quite often a combination of these factors, the frequency increasing as more of these factors exist at the same time. It is my opinion that when several of the etiological agents mentioned are present at the same time, there is a great possibility for the development of cancer eye.

The remainder of this communication will be based on the work I performed at a Sioux City meat packing plant, where I had the opportunity to examine slaughter cattle in the ante-mortem and post-mortem state. Ante-mortem lay inspectors would tag probable cancer eye suspects and upon receiving the suspect card I would examine the animals in the pens. After slaughter I would examine the heads of the animals and the viscera and carcasses when indicated, that is in cases where metastasis had occurred. I examined 76 animals which were condemned in part or in their entirety for epithelioma of the eye. These cases were observed during the period from June 11, 1962 until August 29, 1962.

During this entire period of time I observed 75 epitheliomas in cows, one in a bull, and none in steers. This, I believe can be attributed to the fact that steers are slaughtered before neoplasms have a chance to develop and bulls are fewer and more closely observed and cared for than cows. Some cows are allowed to run loose for as long as a year without observation and then in late summer the herds are culled and any sick animals are sent to market. It is after culling that slaughter houses receive the majority of the animals affected with cancer eye. In this Sioux City plant where I worked, there were 644 cattle tagged for cancer eye from September 29, 1961 until January 8, 1962, while only 364 were tagged from March 26, 1962 until August 29, 1962 (Table I).

Table I
ANTE-MORTEM SUSPECTS
(Special attention to epithelioma)

Group I—2550 Cattle					
	Here- fords	Roan*	Black	F.†	Hol- stein
No. of Cattle	1850	198	211	62	229
% total cattle	73	8	8	2	9
No. of epi- theliomas	618	12	1	7	6
% total epi- theliomas	97	2	.2	1	1
% Herefords with epitheliomas	33	6	..	11	3
Group II—2494 Cattle					
	Here- fords	Roan	Black	F.	Hol- stein
No. of cattle	1640	263	176	57	358
% total cattle	66	11	7	2	14
No. of epi- theliomas	325	15	2	11	11
% total epi- theliomas	89	4	.5	3	3
% Herefords with epitheliomas	20	6	1	19	3

* Includes all red or brown cattle other than Hereford.

† Refers to black white face cattle.

This supports the idea that more cases of cancer eye are seen in slaughter houses in the fall than at any other time of the year.

All of the epitheliomas I observed were in animals over six years of age (Table II). This supports the fact that the inci-

Table II
Age Distribution of Animals Affected with
Cancer Eye

No. of animals affected	5 or less	Age, in years		
		6-8	9-11	12-14
76	0	36	14	26

dence of cancer eye is greatest in older cows because they are allowed to live for relatively longer periods of time, thereby giving the neoplasm a chance to develop.

Work in Denver has revealed that the predisposition to cancer eye in Herefords is no greater than in other breeds but that the more frequent occurrence in Herefords is attributed to the greater number of Herefords slaughtered. Taking a random count of animals slaughtered here in Sioux City, I found that approximately 65-75% of the cattle slaughtered at this point were Herefords. Of 2,550 animals tagged as U. S. suspects between September 29, 1961 and January 1, 1962, 1,850 (approximately 73%) were Herefords and of 2,494 tagged between March 26, 1962 and August 29, 1962, 1,640 (approximately 66%) were Herefords. Referring to Table I, 73% and 66% of the cattle—in this case the Hereford breed—accounted for 97% and 89% respectively, of the epitheliomas. Again referring to Table I, 33% and 20% of the Herefords tagged were tagged for cancer eye, showing a higher incidence than in any of the other breeds. The white faced black cattle showed the next highest percentage of epitheliomas. This perhaps can be explained by the Hereford cross in many of these cattle.

From my observations and results I am of the opinion that Hereford cattle do show a greater susceptibility to cancer eye than other breeds. I do not feel that my information is conclusive by any means, but do feel that the data and facts I have accumulated are substantial in supporting the hypothesis of many investigators, that cancer eye does have a predilection for Hereford cattle.

Other observations I made concerning cancer eye will now be discussed. Of 70 cases studied, 35 showed lesions of cancer eye in the right eye, 28 in the left eye and

7 showed bilateral lesions. There did not seem to be any pattern to the frequency of occurrence in either one eye or the other.

Of 82 lesions studied, 30 were confined to the cornea or eyeball itself, 18 were confined to the nictitating membrane and/or the conjunctiva and lids, and 34 showed lesions involving both the cornea and the conjunctiva and lids. One case showed metastasis to the parotid lymph node and the lungs, 2 cases had metastasized to the parotid, atlantal, and mandibular lymph nodes and the lungs, 2 cases to the parotid, atlantal, and mandibular lymph nodes, 3 cases to the parotid and atlantal lymph nodes, and 13 cases to the parotid lymph node alone. The conjunctiva was involved in all cases in which metastasis had occurred. No metastasis



Ante-mortem Epithelioma of eye

was seen in any case in which the cornea alone was involved. This, I believe to be quite significant evidence to support the belief that because the lymph drainage of the cornea is less profuse than that of the conjunctiva or lids, there is less chance for metastasis to occur. Perhaps this may be a factor in the post-mortem disposition of heads in which only the cornea shows lesions of cancer eye. When sufficient evidence is present to show that metastasis does not accompany the beginning

lesions of cancer eye, the need for condemnation of these heads can be eliminated.

In summary, let us review some of my findings that I consider significant facts in the occurrence of cancer eye.

- (1) Cancer eye is seen most frequently in cows due to the breeding and marketing habits of cattle growers.
- (2) Most cases of cancer eye are seen in the fall due to late summer culling of cattle breeds.
- (3) Cancer eye is observed mainly in animals over 6 years of age.
- (4) There is a greater susceptibility for cancer eye in the Hereford breed (Table I).
- (5) Metastasis is not likely to occur when only the cornea is involved.

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High School Visitation

The High School Visitation Program of the College of Veterinary Medicine of Iowa State University is now beginning its second year of activities. The primary objectives of the program are to stimulate interest in veterinary medical careers among high school students and to inform both high school students and the general public of the real purpose and scope of the veterinary medical profession. The program is sponsored and conducted by the staff and student body of the College of Veterinary Medicine.

Thus far, the program has been directed primarily toward students who have indicated a specific interest in veterinary medicine at career days held at their local or neighboring high schools. Although the response has been favorable, it is our belief that even greater benefits would be realized if the program were presented to entire science or vocational agricultural classes. We believe that more interest could be stimulated in this way, particularly among students who have never considered veterinary medicine as

a possible vocation. To accomplish this, we encourage practitioners to visit with their local superintendent of schools and suggest that he make arrangements with us for such a visit. Wherever it is possible, we hope that the local practitioners will participate not only by arranging for speakers but in the actual presentation of the program as well. Once a student's interest is gained it should be constantly nurtured; therefore follow-up contact by local veterinarians is a highly important phase of the program. Counseling and encouragement by a practicing member of the profession are by far the best methods of creating and maintaining a student's interest.

We also urge each practitioner to promote and sponsor trips to veterinary colleges for young people with an interest in, and aptitude for veterinary medicine. We, at the College of Veterinary Medicine, would be happy to conduct tours and programs for any group desirous of learning more about the profession of veterinary medicine.

Any inquiries concerning the visitation program should be directed to: High School Visitation Committee, Veterinary Administration Building, Room 200, Ames, Iowa.